

# Yiming Che

(607)-338-8871 — [yche1@binghamton.edu](mailto:yche1@binghamton.edu) — [homepage](#) — [github](#)

## PROFESSIONAL SKILLS & KNOWLEDGE

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- **Programming Languages:** Python, C/C++, Scala(learning), Matlab, R
- **Skills:** Pytorch/Tensorflow, Hugging face, Sklearn, Pandas, Linux, Slurm, Git, MySQL, Bash script, AWS, Computer vision (CV), Natural language processing (NLP), PySpark/Spark(learning)
- **Research:** Deep Bayesian learning, Statistical learning/Machine learning with special focus on (deep) Gaussian process, Active learning, Uncertainty quantification

## EDUCATION BACKGROUND

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- **Binghamton University, State University of New York, NY, United States**  
**Department of Systems Science and Industrial Engineering**  
Doctor of Philosophy in Systems Science  
Advisor: Dr. Changqing Cheng  
Expected May 2023  
(I can start to work any time.)
- **Binghamton University, State University of New York, NY, United States**  
**Department of Systems Science and Industrial Engineering**  
Master of Science in Industrial Engineering  
May 2018
- **Capital University of Economics and Business (CUEB), Beijing, China**  
**Department of Industrial Engineering**  
Bachelor of Science in Industrial Engineering  
July 2017

## PROFESSIONAL EXPERIENCE

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- **Research Assistant at Binghamton University** 2019-Present
  1. **Machine Learning/Deep Learning**
    - Physics-informed neural network (PINN) for COVID dynamics (current research)
      - Adopted spatial-temporal SEIR model, e.g., partial differential equation to model COVID dynamics
      - Adopted PINN for data assimilation
      - Trying to include Bayesian framework
    - Bayesian deep learning
      - Trying to efficiently combine Bayesian deep learning and PINN with various inference methods, e.g., Bayes by Backpropagation, Hamiltonian Monte Carlo sampling
      - Working on diffusion model, variational autoencoder for further improvement of Bayesian PINN
    - Deep Gaussian process (DGP)
      - Working on DGP with latent variables for heterogeneous noise, i.e., conditional density estimation
      - Working on importance-weighted variational inference
  2. **Surrogate Modeling and Active Learning/Sequential Design**
    - Developed a novel surrogate model which combines generalized polynomial chaos and stochastic kriging model for efficient surrogate modeling of stochastic systems
      - Significantly reduced computational budget compared to Monte Carlo simulation
      - Achieved high accuracy with small computational budget compared to Monte Carlo simulation
    - Developed a new expected improvement-based sampling algorithm with Gaussian process for active learning/sequential design
      - Reduced size of training set by around 90% compared to traditional one-shot design
      - Achieved high accuracy when only a small fraction of training set is used compared to traditional one-shot design
    - Developed a K-center-based sampling algorithm with relevant vector machine for active learning/sequential design
      - Significantly reduced required training data to achieve high accuracy

- Developed a batch-sampling strategy for efficient contour estimation
  - Significantly reduced training time compared to the single-sample selection strategy
  - Outperform the state-of-the-art method (weighted K-means selection)

### 3. Uncertainty Quantification

- Developed framework for generalized polynomial chaos expansion for uncertainty quantification of stability of chaotic systems with discrete delays
  - Reduced computational budget of time-domain simulations for uncertainty quantification
  - Devised maximum entropy method for density estimation

## AWARD & HONOR

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• Graduate School Travel Grant, Binghamton University	2022
• INFORMS Bonder Foundation Award	2021
• Finalist, IISE-DAIS Mobile App Competition at 2021 IISE Annual Conference and Expo	2021
• Binghamton University Graduate Student Excellence Award in Research ( <b>top 1%</b> )	2021
• Travel Grant of Midwest Dynamical Systems Conference 2019, University of Illinois at Chicago	2019
• Second Place, Best Student Paper Competition at 2019 IISE Annual Conference and Expo (Healthcare track)	2019
• Honorable Mention, Binghamton University Research Day Poster Competition, 2018	2018
• National Scholarship, Capital University of Economics and Business	2015

## JOURNAL PUBLICATIONS

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1. **Che, Y.** and Cheng, C. “Physical-statistical learning towards resilience assessment for power generating systems,” *Physica A: Statistical Mechanics and its Applications* (2023): 128584. <https://doi.org/10.1016/j.physa.2023.128584>
2. **Che, Y.**, Muller, J and Cheng, C. “Dispersion-enhanced sequential batch sampling for contour estimation,” *Quality and Reliability Engineering International*. <https://doi.org/10.1002/qre.3245>
3. Ma, Q., **Che, Y.**, Cheng, C. and Wang, Z. “Characterizations and optimization for resilient manufacturing systems with considerations of process uncertainties,” *Journal of Computing and Information Science in Engineering* (2022): 1-30. <https://doi.org/10.1115/1.4055425>
4. Wan, J., **Che, Y.**, Wang, Z. and Cheng, C. “Uncertainty quantification and optimal robust design for machining operations,” *Journal of Computing and Information Science in Engineering* 23.1 (2022): 0110005. <https://doi.org/10.1115/1.4055039>
5. **Che, Y.** and Cheng, C. “Active learning and relevance vector machine in efficient estimate for basin stability of dynamic networks,” *Chaos: An Interdisciplinary Journal of Nonlinear Science* 31.5 (2021): 053129. <https://doi.org/10.1063/5.0044899>.
6. **Che, Y.**, Guo, Z. and Cheng, C. “Generalized polynomial chaos-informed efficient stochastic Kriging,” *Journal of Computational Physics* (2021): 110598. <https://doi.org/10.1016/j.jcp.2021.110598>.
7. Wu, X., Zheng, Y., **Che, Y.** and Cheng, C. “Pattern recognition and automatic identification of early-stage atrial fibrillation,” *Expert Systems with Applications* (2020): 113560. <https://doi.org/10.1016/j.eswa.2020.113560>.
8. **Che, Y.**, Cheng, C., Liu, Z. and Zhang, Z. “Fast basin stability estimation for dynamic systems under large perturbations with sequential support vector machine,” *Physica D: Nonlinear Phenomena* (2020): 132381. <https://doi.org/10.1016/j.physd.2020.132381>.
9. **Che, Y.**, Liu, J. and Cheng, C. “Multi-fidelity modeling in sequential design for identification of stability region in dynamic time-delay systems,” *Chaos: An Interdisciplinary Journal of Nonlinear Science* 29.9 (2019): 093-105. <https://doi.org/10.1063/1.5097934>.
10. **Che, Y.** and Cheng, C. “Uncertainty quantification in stability analysis of chaotic systems with discrete delays,” *Chaos, Solitons & Fractals* 116 (2018): 208-214. <https://doi.org/10.1016/j.chaos.2018.08.024>.